

**What is claimed:**

1. An environmentally stable product of a process for thermo-chemical remediation and decontamination of sediments and soils contaminated with organic materials as well as inorganic contaminants and heavy metals, the process comprising the steps of:

- a) blending said contaminated sediments or soils with a calcium oxide source, alumina, ferric oxides and fluxing agent to form a mixture;
- b) heating the mixture to produce a molten reaction product;
- c) bubbling oxygen through the reaction product for destruction of said organic contaminants;
- d) quenching the reaction product in the presence of moist air, steam or water to form an amorphous material having a silicate network, and thereby incorporating inorganic contaminants and heavy metals within the silicate network;
- e) pulverizing the amorphous material to form a powder;
- f) blending the powder with cement to yield a blended cement.

2. The product of Claim 1, wherein said fluxing agent is calcium fluoride.

3. A reactive melt product which is amorphous and has the composition of: calcium oxide (CaO), about 20 to 40 wt%; silica (SiO<sub>2</sub>), about 45 to 65 wt%; alumina (Al<sub>2</sub>O<sub>3</sub>), about 5 to 20 wt%; ferric oxide (Fe<sub>2</sub>O<sub>3</sub>), about 2 to 10 wt%; and fluxing agent, about 0 to 5 wt%.

4. The reactive melt product of Claim 3, further including minor chemical components of magesia (MgO), alkalis (Na<sub>2</sub>O and K<sub>2</sub>O), sulfur trioxide (SO<sub>3</sub>) present as

gypsum, halogens present as halogenated inorganics, phosphorus oxide ( $P_2O_5$ ), titanium oxide ( $TiO_2$ ) and strontium oxide ( $SrO$ ).

5. The reactive melt product of Claim 3, wherein the melting point of the reactive melt is between the temperatures of about 1150° to about 1400°C.

✓ 6. The reactive melt product of Claim 3 further mixed with 2.75 parts of sand and 0.484 part of 20 wt% NaOH aqueous solution for every one part of the reactive melt product, to yield a mortar with high compressive strength greater than 21.4 Mpa.

7. The reactive melt product of Claim 3 further blended with portland cement to yield a blended cement.

8. The reactive melt product of Claim 3, wherein heavy metals are incorporated in a silicate network within the reactive melt product.

5 9. A blended cement comprising a mixture of portland cement and a reactive melt product, said reactive melt product including  $CaO$ ,  $SiO_2$ ,  $Al_2O_3$ ,  $Fe_2O_3$  and  $CaF_2$ , the weight ratio of reactive melt product to portland cement being from about 10 parts of reactive melt product to about 90 parts of portland cement up to about 70 parts of reactive melt product to about 30 parts of portland cement.

10. The blended cement of Claim 9, wherein the reactive melt product component consumes hydrated lime present in said portland cement.

11. The blended cement of Claim 9, wherein said reactive melt product has the composition of: calcium oxide ( $CaO$ ), about 20 to 40 wt%; silica ( $SiO_2$ ), about 45 to 65

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wt%; alumina ( $\text{Al}_2\text{O}_3$ ), about 5 to 20 wt%; ferric oxide ( $\text{Fe}_2\text{O}_3$ ), about 2 to 10 wt%; and  
fluxing agent, about 0 to 5 wt%.